No. 9600183

# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

## NDSU Research Foundation

**Whereas,** THERE HAS BEEN PRESENTED TO THE

**Secretary of Agriculture**

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED, PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

*BARLEY*

*'Logan'*

*In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this twenty-eighth day of June in the year of our Lord one thousand nine hundred and ninety-six.*

*Attest:*

*Marsha A. Stanton*
*Commissioner*
*Plant Variety Protection Office*
*Agricultural Marketing Service*

*Dan Glickman*
*Secretary of Agriculture*

REPRODUCE LOCALLY. *Include form number and date on all reproductions.* FORM APPROVED - OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE DIVISION - PLANT VARIETY PROTECTION OFFICE

# APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

*(Instructions and information collection burden statement on reverse)*

*The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a).*

*Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).*

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
NDSU Research Foundation

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER
ND11231-11

3. VARIETY NAME
'LOGAN'

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
c/o Executive Director
P.O. Box 5014
Fargo, ND 58105

5. TELEPHONE *(include area code)*
701-231-8931

6. FAX *(include area code)*
701-231-1013

**FOR OFFICIAL USE ONLY**

PVPO NUMBER
9600183

FILING DATE
Mar 15 1996

FEES RECEIVED
FILING AND EXAMINATION FEE
$ 2450.00
DATE
Mar. 15 1996
CERTIFICATION FEE
$ 300.00
DATE
5-28-96

7. GENUS AND SPECIES NAME
Hordeum vulgare L.

8. FAMILY NAME *(Botanical)*
Gramineae

9. CROP KIND NAME *(Common name)*
Barley

10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.) (Common name)*
501(c)(3) Corporation - NDSU Research Foundation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION
North Dakota

12. DATE OF INCORPORATION
May, 1989

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

Jerome D. Franckowiak
Department of Plant Sciences
North Dakota State University
P.O. Box 5051
Fargo, ND 58105-5051

Dale Zetocha
Executive Director
NDSU Research Foundation
P.O. Box 5014
Fargo, ND 58105-5014

14. TELEPHONE *(include area code)*
701-231-7540

15. FAX *(include area code)*
701-231-8474

16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow instructions on reverse)*

a. ☐ Exhibit A. Origin and Breeding History of the Variety
b. ☐ Exhibit B. Statement of Distinctness
c. ☐ Exhibit C. Objective Description of the Variety
d. ☐ Exhibit D. Additional Description of the Variety
e. ☐ Exhibit E. Statement of the Basis of the Applicant's Ownership
f. ☐ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in a public repository)*
g. ☐ Filing and Examination Fee ($2,450), made payable to "Treasurer of the United States" *(Mail to PVPO)*

17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act)?*
☒ YES *(If "yes," answer items 18 and 19 below)* ☐ NO *(If "no," go to item 20)*

per letter of May 1, 1996 [illegible] 5-7-96

18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☒ YES ☐ NO

19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☒ FOUNDATION ☒ REGISTERED ☒ CERTIFIED

20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
☐ YES *(If "yes," give names of countries and dates)* ☐ NO USA - Release date March 31, 1995
USA - First seed sale October 1, 1995

21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *(Owner(s))*
Dale Zetocha

NAME *(Please print or type)*
Dale Zetocha

CAPACITY OR TITLE
Executive Director
NDSU Research Foundation

DATE
3/14/96

SIGNATURE OF APPLICANT *(Owner(s))*

NAME *(Please print or type)*

CAPACITY OR TITLE

DATE

SD-470 (04-95) *(Previous editions are to be destroyed)*

*(See reverse for instructions and information collection burden statement)*

## EXHIBIT A - ORIGIN AND BREEDING HISTORY

## 'LOGAN'

The original cross was made at North Dakota State University (NDSU), Fargo, ND in the 1985 spring greenhouse nursery and involved lines from crosses between six- and two-rowed barley cultivars. The cross C2-85-166 was made between an $F_4$ selection from the cross ND7085/ND4994-15 as the female parent and ND7556 as the male parent. ND4994-15 is a sister selection of the cultivar Bowman. ND7556 was selected as net blotch resistant two-rowed line from the cross Norbert//ND4856/M37. ND7085 is a two-rowed selection from the cross ND1244/ND2678//Hector/3/Multum/ND1351//Karl. ND4856 was selected from the cross Klages/ND1244. ND2678 was selected from a Klages//Fergus/Nordic cross. ND1244 and ND1351 are six-rowed selections from crosses to Traill and Bonanza, respectively. Karl, which is noted for low grain protein, is a six-rowed cultivar released by the USDA-ARS Small Grains Research Facility at Aberdeen, Idaho. Fergus, Hector, Klages, and Multum are two-rowed barley cultivars; Nordic is a six-rowed cultivar; Norbert is a two-rowed cultivar released by Agriculture Canada, Winnipeg Station; and M37 is a low protein, six-rowed selection made by the barley improvement program at the University of Minnesota from the cross Manker/Karl//M18.

ND11231-11 is an $F_6$ derived selection made in 1991 from the line ND11231, which is an $F_3$ selection made in 1988 from the cross C2-85-166. ND11231 was reselected because it was mixed for spot reaction, maturity, and leaf width. ND11231-11 has a white aleurone, long rachilla hairs, and semi-smooth awns. It heads later than sister selections and has wider leaves.

Agronomic and yield data were collected for ND11231 from trials grown in North Dakota in 1988 to 1992 and for ND11231-11 from trials grown 1991 to 1994. ND11231 averaged nearly a 10% higher in yield compared to both Bowman and Hazen during the relatively dry years. ND11231-11 was equal to Hazen in the relatively wet years and much superior to Bowman. Both ND11231 and its reselect ND11231-11 were superior to Hazen in average test weight, but a test weight advantage over Bowman was observed only during the wet years. ND11231-11 is heads one day than Bowman, is equal to Bowman in height, and is equal to Hazen in lodging score.

Data from micromalting tests were collected for both ND11231 and ND11231-11 from 1988 to 1994. The data comparisons showed that ND11231 is superior to Bowman in malt extract and diastatic power even though the grain protein level is nearly one percent lower. Malt quality data were used in making the decision that ND11231 offered sufficient promise to be reselected. Malt quality data accumulated for ND11231-11 and

check cultivars demonstrate that the advantages of ND11231-11 are similar to those of ND11231. Both selections probably have the gene for low protein from Karl. Samples of ND11231-11 that were submitted in 1992 and 1993 for pilot scale quality tests conducted by the American Malting Barley Association (AMBA) were too low in alpha-amylase activity and malt extract, respectively, compared with the two-rowed checks grown in western USA.

ND11231-11 was released by the North Dakota Agricultural Experiment Station in March 1995 and the name Logan was recommended. Logan is classified by AMBA as a two-rowed non-malting barley until further malt quality tests are conducted and the results evaluated. During the summer of 1995, foundation seed was planted in North Dakota to produce the registered class of seed.

Logan is uniform for all traits except awn surface. Logan seed lots contain rough awns variants at a frequency of less than 1/1,000, but they difficult to identify because Logan's semi-smooth awns have relatively rough tips.

Selection criteria:
Low spot blotch resistance, semi-smooth awns, low grain protein content and relatively high diastatic power.

Uniform and stable last 4 generations

per letter of April 27, 1996 MAH 5-1-96

## EXHIBIT B - NOVELTY STATEMENT

To my knowledge, Logan resembles Bowman and Stark barley more than any other two-rowed barley cultivars. All three cultivars have semi-smooth awns, long rachilla hairs, and teeth on lateral veins of the lemma. Logan has semicompact spikes, while those of Bowman and Stark are lax (semi-lax) in kernel arrangement. Logan seedlings show the red anthocyanin pigment at the base of the sheath controlled by the *Rs* gene in chromosome 1. Bowman and Stark have the recessive allele and seedlings show very limited pigmentation at the base of the plant. Logan has the *Mlk* gene for resistance to powdery mildew, incited by *Erysiphe graminis* f. sp. *hordei*, while Bowman and Stark are susceptible to powdery mildew.

FORM APPROVED: OMB NO. 40-R3822

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK AND SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
*(Barley)*

# OBJECTIVE DESCRIPTION OF VARIETY
## BARLEY *(HORDEUM VULGARE)*

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(s)
NDSU Research Foundation

ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*
Box 5014
Fargo, ND 58105-5014

FOR OFFICIAL USE ONLY
PVPO NUMBER
9600183
VARIETY NAME OR TEMPORARY DESIGNATION

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (i.e. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

**1. GROWTH HABIT:**

[1] 1 = SPRING 2 = FACULTATIVE WINTER 3 = WINTER [3] Early Growth: 1 = PROSTRATE 2 = SEMIPROSTRATE 3 = ERECT

**2. MATURITY (50% Flowering):**

[2] 1 = EARLY (California Mariout) 2 = MIDSEASON (Betzes) 3 = LATE (Frontier)

[4] No. of days *Earlier* than ..... [1]
[ ] No. of days *Later* than ..... [ ]
1 = BETZES 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON 5 = PIROLINE 6 = PRIMUS 7 = UNITAN

**3. PLANT HEIGHT (From soil level to top of head):**

[3] 1 = SEMIDWARF 2 = SHORT (California Mariout) 3 = MEDIUM TALL (Betzes) 4 = TALL (Conquest)

[0][8] Cm. *Shorter* than ..... [5]
[ ][ ] Cm. *Taller* than ..... [ ]
1 = BETZES 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON 5 = PIROLINE 6 = PRIMUS 7 = UNITAN

**4. STEM:**

[2] Exertion *(Flag to spike at maturity)*: 1 = 0 - 3 cm. 2 = 3 - 10 cm. 3 = 10 - 15 cm.
[2] Anthocyanin: 1 = ABSENT 2 = PRESENT

[0.5] NO. OF NODES (Originating from node above ground)

[1] Collar Shape: 1 = CLOSED 2 = V-SHAPED 3 = OPEN 4 = MODIFIED CLOSED OR OPEN
[1] Shape of Neck: 1 = STRAIGHT 2 = SNAKY 3 = OTHER (Specify) _____

**5. LEAF:**

[1] Basal leaf sheath *(seedling)*: 1 = GLABROUS 2 = PUBESCENT
[2] Position of flag leaf *(at boot stage)*: 1 = DROOPING 2 = UPRIGHT

[3] Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY 3 = WAXY
[1][5] MM. WIDTH (First leaf below flag leaf)

[2][5] CM. LENGTH (First leaf below flag leaf)
[2] Anthocyanin in leaf sheath: 1 = ABSENT 2 = PRESENT

**6. HEAD:**

[1] Type: 1 = TWO-ROWED 2 = SIX-ROWED
[3] Density: 1 = LAX 2 = ERECT (Not dense) 3 = ERECT (Dense)

[2] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify) _____
[3] Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY 3 = WAXY

[1] Lateral Kernels Overlap: 1 = NONE 2 = AT TIP 3 = 1/4 - 1/2 OF HEAD
[2] Rachis *(Hair on edge)*: 1 = LACKING 2 = FEW 3 = COVERED

**7. GLUME:**

[2] Length: 1 = 1/3 OF LEMMA 2 = 1/2 OF LEMMA 3 = MORE THAN 1/2 OF LEMMA
[3] Hairs: 1 = NONE 2 = SHORT 3 = LONG

[3] Hair covering: 1 = NONE 2 = RESTRICTED TO MIDDLE 3 = CONFINED TO BAND 4 = COMPLETELY COVERED

[2] Awns: 1 = LESS THAN EQUAL TO LENGTH OF GLUMES 2 = EQUAL TO LENGTH OF GLUMES 3 = MORE THAN EQUAL TO LENGTH OF GLUMES

[2] Awn Surface: 1 = SMOOTH 2 = SEMISMOOTH 3 = ROUGH

9600183

**8. LEMMA:**

[5] Awn: 1 = AWNLESS 2 = AWNLETS ON CENTRAL ROWS, AWNLESS ON LATERAL ROWS 3 = SHORT ON CENTRAL ROWS, AWNLETS ON LATERAL ROWS 4 = SHORT (less than equal to length of spike) 5 = LONG (longer than spike) 6 = HOODED

[3] Awn Surface: 1 = AWNLESS 2 = SMOOTH 3 = SEMISMOOTH 4 = ROUGH

[2] Teeth: 1 = ABSENT 2 = FEW 3 = NUMEROUS

[1] Hair: 1 = ABSENT 2 = PRESENT

[1] Shape of base: 1 = DEPRESSION 2 = SLIGHT CREASE 3 = TRANSVERSE CREASE

[2] Rachilla Hairs: 1 = SHORT 2 = LONG

**9. STIGMA:**

[1] Hairs: 1 = FEW 2 = MANY

**10. SEED:**

[2] Type: 1 = NAKED 2 = COVERED

[1] Hairs on Ventral Furrow: 1 = ABSENT 2 = PRESENT

[4] Length: 1 = SHORT (8.0 mm.) 2 = SHORT TO MIDLONG (7.5 - 9.0 mm.) 3 = MIDLONG (8.5 - 9.5 mm.) 4 = MIDLONG TO LONG (9.0 - 10.5 mm.) 5 = LONG (10.0 mm.)

[3] Wrinkling of hull: 1 = NAKED 2 = SLIGHTLY WRINKLED 3 = SEMIWRINKLED 4 = WRINKLED

[1] Aleurone Color: 1 = COLORLESS (White or Yellow) 2 = BLUE

[0][2] PERCENT ABORTIVE

[4][0] GMS. PER 1000 SEEDS

**11. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)**

| | | | |
|---|---|---|---|
| [1] SEPTORIA | [2] NET BLOTCH | [2] SPOT BLOTCH | [2] POWDERY MILDEW |
| [1] LOOSE SMUT | [1] BACTERIAL BLIGHT | [1] COVERED SMUT | [0] FALSE LOOSE SMUT |
| [1] STEM RUST | [1] LEAF RUST | [1] SCAB | [1] SCALD |
| [1] AY | [2] BSMV | [1] BYDV | [ ] OTHER (Specify) |

**12. INSECT: (0 = Not tested, 1 = Susceptible, 2 = Resistant)**

| | | | |
|---|---|---|---|
| [1] GREEN BUG | [1] ENGLISH GRAIN APHID | [0] CHINCH BUG | [0] ARMYWORM |
| [0] GRASS HOPPERS | [0] CEREAL LEAF BEETLE | [ ] OTHER (Specify) | |

HESSIAN FLY RACES: [ ] GP [ ] A [ ] B [ ] C [ ] D [ ] E [ ] F [ ] G

**13. CHEMICAL (0 = Not Tested, 1 = Susceptible, 2 = Resistant)**

[0] DDT [ ] OTHER (Specify)

**14. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:**

| CHARACTER | NAME OF VARIETY | CHARACTER | NAME OF VARIETY |
|---|---|---|---|
| Plant tillering | Bowman | Seed size | Bowman |
| Leaf size | Stark | Coleoptile elongation | Bowman |
| Leaf color | Bowman | Seedling pigmentation | Gallatin |
| Leaf carriage | Bowman | | |

**REFERENCES:** The following publications may be used as a reference aid for the standardization of character descriptions and terms used in this form:


1. Wiebe, G. A., and D. A. Reid, 1961, Classification of Barley Varieties Grown in the United States and Canada in 1958, Technical Bulletin No. 1224, U.S. Dept. of Agriculture.
2. Reid, D. A., and G. A. Wiebe, 1968, Barley: Origin, Botany, Culture, Winter Hardiness, Genetics, Utilization, Pests, Agriculture Handbook No. 338, U.S. Dept. of Agriculture. pp. 61 - 84.
3. Malting Barley Improvement Association, Milwaukee, Wisconsin, 1971, Barley Variety Dictionary.


COLOR: Nickerson's or any recognized color fan may be used to determine color of the described variety.

**EXHIBIT E -**
**STATEMENT OF THE BASIS OF THE APPLICANT'S OWNERSHIP**

Dr. Jerome D. Franckowiak, an employee of the North Dakota Agricultural Experiment Station and North Dakota State University, is the plant breeder who developed the two-rowed spring barley cultivar 'LOGAN' for which Plant Variety Protection is hereby sought. The employee by agreement and because of the condition of the use of facilities and funds of the North Dakota Agricultural Experiment Station and North Dakota State University has assigned all ownership rights to 'LOGAN' barley to the North Dakota Agricultural Experiment Station and North Dakota State University.

North Dakota State University on behalf of the North Dakota Agricultural Experiment Station has assigned all ownership rights to the NDSU Research Foundation. The NDSU Research Foundation is a nonprofit corporation set up to own and manage the intellectual property of North Dakota State University.